REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following Remarks is respectfully requested.

Claims 1-38 are presently active in this case. No claim amendments are made herein, and no change in claim scope is contemplated by the following Remarks.

In the outstanding Office Action, Claims 1-8, 17-19 and 22-38 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Publication 2003\0143328 to Chen et al.; Claims 20 and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al.; and Claims 9-16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al. in view of U.S. Patent No. 4,713,662 to Wiegand.

Applicant first notes that Applicant's representative has made attempts to schedule an interview by contacting Examiner Fuller, the examiner assigned tot his case, at (571) 272-1420. However, a personal interview did not result from these efforts. Therefore, Applicant respectfully requests that the assigned Examiner contact the undersigned to schedule a personal interview in this case prior to acting on the present response.

Turning now to the merits, Applicant's invention is directed to a method and system for performing atomic layer deposition in high aspect ratio features. As discussed in the Background section of Applicant's specification, as aspect ratios of features increase, the specie transport local to the features becomes increasingly important to preserve the conformality of the deposition within the feature.[1] However, due to the low densities associated with low pressure processing and the lack of chemical transport directivity local to the substrate material features, chemical transport can be severely limited in high aspect ratio features. Applicant's invention is directed to mitigating these problems thereby improving

[1] Applicant's specification at paragraph [0007].

chemical transport to high aspect ratio features and improving processes, for example deposition, within the high aspect ratio feature.

Specifically, Applicant's independent Claim 1 recites an atomic layer deposition system including a process chamber, a substrate holder provided within the process chamber and configured to support a substrate, and a gas injection system configured to supply a first precursor and a second precursor to the process chamber. Also recited is a controller configured to control the gas injection system to continuously flow the first precursor to the process chamber and to pulse the second precursor to the process chamber at a first time, the controller also being configured to pulse an RF power to the substrate holder at a second time in order to sequentially deposit at least one monolayer on the substrate. Thus, Applicant's independent Claim 1 requires pulsing the gas flow of the second precursor and also pulsing RF power to the substrate holder. Applicant's independent Claims 26 and 38 recite similar features in method and means plus function claim format. As discussed in Applicant's specification as originally filed, pulsing the gas flow in combination with pulsing the RF power can improve chemical transport at the substrate surface. In particular, pulsing the RF power on the substrate holder leads to an increase in the potential drop across the sheet for a duration characteristic of the pulse width during which the sheet thickness is enlarged. This facilitates atomic layer deposition and, in particular, can improve conformality of deposition within high aspect ratio features.[2]

In contrast, the cited reference to Chen et al. discloses a plasma enhanced deposition system wherein the plasma is created adjacent to a processing region where the substrate is processed. As seen in Figure 2, the apparatus includes a top shower plate 160 and a bottom slow plate 170. RF power source 190 applies RF power to the top and/or bottom shower plate in order to generate a plasma between these shower plates. Such plasma then diffuses

[2] See Applicant's specification at paragraph [0018].

into the processing region above the substrate holder. However, Figure 2 and paragraphs [0030]-[0031] describing the substrate holder in Chen et al. do not teach or suggest that RF power, or any voltage, is applied to the substrate holder. Thus, contrary to the position taken in the outstanding Office Action, Chen et al. does not disclose a controller configured to pulse an RF power ***to the substrate holder*** as required by Applicant's independent Claims 1, 26 and 38. Thus, Chen et al. cannot provide the improved specie transport and deposition conformality provided by Applicant's claimed invention.

Applicant further notes that independent Claim 26 additionally recites both igniting a processing plasma in the process chamber, and pulsing an RF power to the substrate holder. This covers the example of Figure 2 of Applicant's specification, which shows that the RF power is provided at a first level 134 for igniting a plasma, and then pulsed to a second higher power level 132 in order to improved specie transport at the substrate surface. By contrast, Figures 6-8 and 10 of Chen et al. disclose only pulsing the RF power completely on or completely off to generate a plasma while the power is pulsed. Therefore, Applicant's Claim 26 provides an additional basis for patentability over Chen et al.

For the reasons discussed above, Applicant's independent Claims 1, 26 and 38 patentably define over the cited references. As the remaining pending claims in this case depend from Claim 1, 26 or 38, these dependent claims also patentably define over the cited references. Nevertheless, Applicant notes that dependent Claims 9-16 recite features to further distinguish over the cited references. Specifically, Claim 9 recites an oscillator coupled to the substrate holder for providing RF power, and Claim 10 recites an amplifier coupled to the oscillator. Claims 11-16 recite further characteristics of the amplifier and/or the impedance match network and a waveform generator in relation to the amplifier. As discussed in Applicant's specification, use of the amplifier allows pulse generation at reduced

pulse widths.[3] The outstanding Office Action acknowledges that Chen et al. does not disclose any of these features, but cites Wiegand as teaching the features of Claims 9-16. Wiegand discloses a digital radio frequency memory system for storing and retrieving radio frequency signals in a digital memory. Applicant respectfully suggests that even if Wiegand discloses each of the RF components recited in Applicant's Claims 9-16, there is simply no motivation to combine the RF components of a digital radio frequency memory system with a semiconductor processing system and method to arrive at a teaching of Applicant's claims. This is particularly true in view of the fact that Chen et al. does not disclose an RF system coupled to the substrate holder at all, as noted above. Therefore, Applicant's Claims 9-16 provide a further basis for patentability over the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application and the present application is believed to be in condition for formal allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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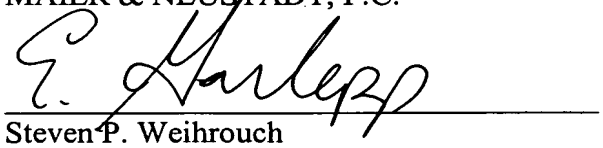

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[3] See Applicant's specification at paragraph [0065].